



# MATHS

**BOOKS - CBSE COMPLEMENTARY**

**MATERIAL MATHS (HINGLISH)**

**SOME APPLICATIONS OF**

**TRIGONOMETRY**

**Very Short Answer Type Questions**

1. The length of shadow of a tower on the plane ground is  $\sqrt{3}$  times the height of the tower. The angle of elevation of sun is.

A.  $45^\circ$

B.  $30^\circ$

C.  $60^\circ$

D.  $90^\circ$

**Answer: B**



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2. The tops of two poles of height 16 m and 10 m are connected by a wire of length  $l$  metres. If the wire makes an angle of  $30^\circ$  with the horizontal, then  $l$

A. 26 m

B. 16 m

C. 12 cm

D. 10 m

**Answer: C**



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3. A pole of height 6 m casts a shadow  $2\sqrt{3}$  m long on the ground. Find the sun's elevation.

A.  $30^\circ$

B.  $60^\circ$

C.  $45^\circ$

D.  $90^\circ$

**Answer: B**



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4. A ladder leaning against a wall makes an angle of  $60^\circ$  with the horizontal. If the foot of the ladder is 2.5 m away from the wall, find the length of the ladder.

A. 3 m

B. 4 m

C. 5 m

D. 6 m

**Answer: C**



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5. If a tower 30 m high, casts a shadow  $10\sqrt{3}m$  long on the ground, then what is the angle of elevation of the sun ?

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $90^\circ$

**Answer: C**



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6. A tower is 50 m high. When the sun's altitude is  $45^\circ$  then what will be the length of its shadow ?



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7. The length of shadow of a pole 50 m high is  $\frac{50}{\sqrt{3}}$  m. find the sun's altitude.



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8. Find the angle of elevation of a point which is at a distance of 30 m from the base of a tower  $10\sqrt{3}$  m high.



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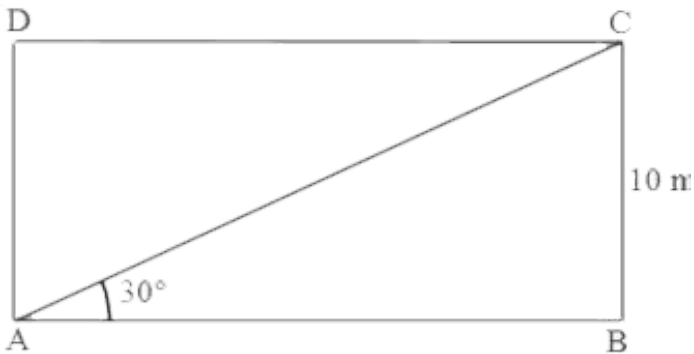
9. A kite is flying at a height of  $50\sqrt{3}$  m from the horizontal. It is attached with a string and makes an angle  $60^\circ$  with the horizontal. Find the length of the string.



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10. In the given figure find the perimeter of rectangle ABCD.



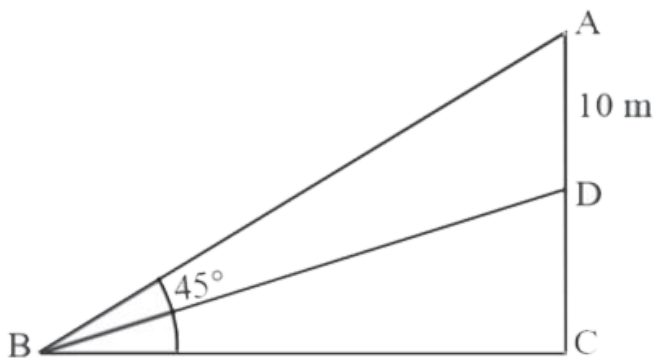
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11. If the length of the shadow of a tower is  $\sqrt{3}$  times its height of then the angle of elevation of the sun is



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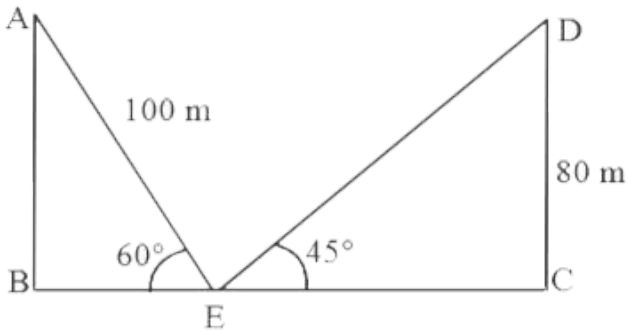
12. In the figure, find the value of DC.



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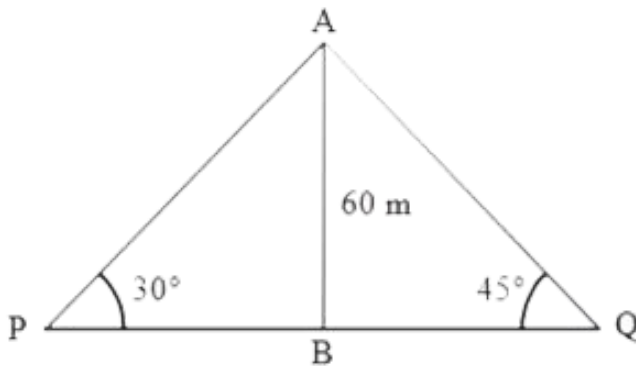
## Short Answer Type Questions

1. In the figure, find the value of BC.



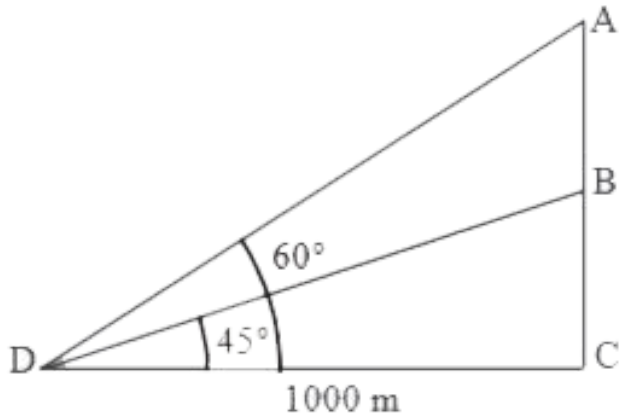
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2. In the figure, two persons are standing at the opposite direction P & Q of the tower. If the height of the tower is 60 m then find the distance between the two persons.



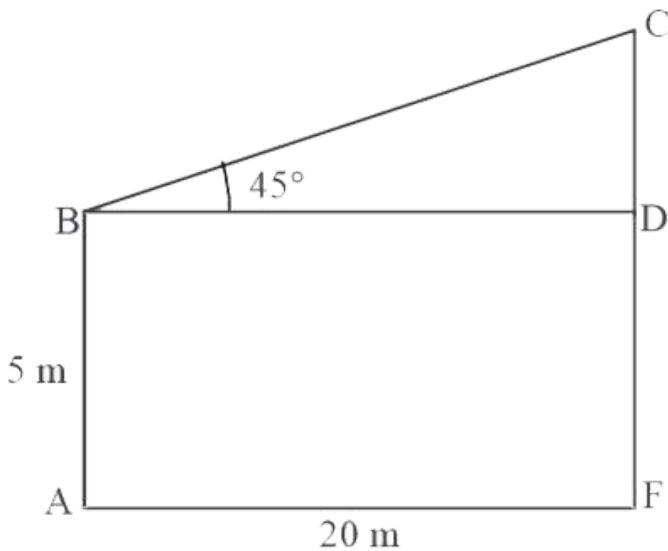
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3. In the figure, find the value of AB.



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4. In the figure, find the value of CF.



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5. If the horizontal distance of the boat from the bridge is  $25\text{ m}$  and the height of the

bridge is 25 m, then find the angle of depression of the boat from the bridge.



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**6. State True/False.**

If the length of the shadow of a tower is increasing, then the angle of elevation of the sun is also increasing.



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7. If a man standing on a platform 3 m above the surface of a lake observes a cloud and its reflection in the lake at this time the height of reflection of cloud in lake is  $(h+3)$  because in lake platform height is also added to reflection of cloud.

So, angle of depression is different in the lake from the angle of elevation of the cloud is equal to the angle of depression of its reflection.



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8. The angle of elevation of the top of a tower is  $30^\circ$ . If the height of the tower is doubled, then the angle of elevation of its top will also be doubled.



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9. From the top of a hill, the angles of depression of two consecutive kilometre stones due east are found to be  $30^\circ$  and  $45^\circ$ .

Find the height of the hill.





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**10.** The string of a kite is 150 m long and it makes an angle  $60^\circ$  with the horizontal. Find the height of the kite above the ground.  
(Assume string to be tight)



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**11.** The shadow of a vertical tower on level ground increases by 10 m when the altitude of

the sun changes from  $45^\circ$  to  $30^\circ$ . Find the height of the tower.



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**12.** An aeroplane at an altitude of 200 m observes angles of depression of opposite points on the two banks of the river to be  $45^\circ$  and  $60^\circ$ , find the width of the river.



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**13.** The angle of elevation of a tower at a point is  $45^\circ$ . After going 40 m towards the foot of the tower, the angle of elevation of the tower becomes  $60^\circ$ . Find the height of the tower.



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**14.** The upper part of a tree broken over by the wind makes an angle of  $30^\circ$  with the ground and the distance of the root from the point

where the top touches the ground is 25 m.

What was the total height of the tree?



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**15.** A vertical flagstaff stands on a horizontal plane. From a point 100 m from its foot, the angle of elevation of its top is found to be  $45^\circ$ . Find the height of the flagstaff.



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**16.** The length of a string between kite and a point on the ground is 90 m. If the string makes an angle with the level ground and  $\sin \alpha = \frac{3}{5}$ . Find the height of the kite. There is no slack in the string.



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**17.** An aeroplane, when 3000 m high, passes vertically above another aeroplane at an instant when the angles of elevation of the

two planes from the same point on the ground are  $45^\circ$  and  $60^\circ$  respectively. Find the vertical distance between the two planes.



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**18.** A 7 m long flagstaff is fixed on the top of a tower on the horizontal plane. From a point on the ground, the angles of elevation of the top and bottom of the flagstaff are  $45^\circ$  and  $30^\circ$  respectively. Find the height of the tower.



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**19.** From the top of a 7 m high building, the angle of elevation of the top of a tower is  $60^\circ$  and the angle of depression of the foot of the tower is  $30^\circ$ . Find the height of the tower.



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**20.** Anand is watching a circus artist climbing a 20m long rope which is tightly stretched and tied from the top of vertical pole to the



ground. Find the height of the pole if the angle made by the rope with the ground level is  $30^\circ$ .



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## Long Answer Type Questions

1. The angle of elevation of a cloud from a point 60m above a lake is  $30^\circ$  and the angle of depression of the reflection of cloud in the lake is  $60^\circ$ . Find the height of the cloud.



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2. A man standing on the deck of a ship, which is 10m above water level. He observes the angle of elevation of the top of a hill as  $60^{\circ}$  and the angle of depression of the base of the hill as  $30^{\circ}$ . Calculate the distance of the hill from the ship and the height of the hill.



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3. From a window 60 m high above the ground of a house in a street, the angle of elevation and depression of the top and the foot of another house on the opposite side of the street are  $60^\circ$  and  $45^\circ$  respectively. Show that the height of opposite house is  $60(1 + \sqrt{3})$  metres.



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4. The angle of elevation of a jet plane from a point A on the ground is  $60^\circ$ . After a flight of 30 seconds, the angle of elevation changes to  $30^\circ$ . If the jet plane is flying at a constant height of  $3600\sqrt{3}m$ , find the speed of the jet plane.



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5. A bird is sitting on the top of a 80 m high tree. From a point on the ground, the angle of

elevation of the bird is  $45^\circ$ . The bird flies away horizontally in such a way that it remained at a constant height from the ground. After 2 seconds, the angle of elevation of the bird from the same point is  $30^\circ$ . Find the speed of flying of the bird. (Take  $\sqrt{3} = 1.732$ ).



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**6.** If the angles of elevation of the top of a tower from two points at a distance of 4m and 9m from the base of the tower and in the

same straight line with it are complementary, find the height of the tower.



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7. A boy standing on a horizontal plane finds a bird flying at a distance of 100 m from him at an elevation of  $30^\circ$ . A girl standing on the roof of 20 metre high building, finds the angle of elevation of the same bird to be  $45^\circ$ . Both the boy and the girl are on opposite sides of the bird. Find the distance of bird from the girl.



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8. As observed from the top of a lighthouse, 100 m above sea level, the angle of depression of a ship, sailing directly towards it, changes from  $30^\circ$  to  $60^\circ$ . Determine the distance travelled by the ship during the period of observation. [Use  $\sqrt{3} = 1.732$ ].



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**9.** The angles of elevation and depression of the top and bottom of a light house from the top of a building 60 m high are  $30^\circ$  and  $60^\circ$  respectively. Find

The difference between the height of the light house and the building.



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**10.** The angles of elevation and depression of the top bottom of a light-house from the top



of a 60m high building are  $30^\circ$  and  $60^\circ$  respectively. Find the difference between the heights of the light house and the building. the distance between the light-house and the building.



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11. A fire in a building  $B$  is reported on telephone to two fire stations  $P$  and  $Q$ , 20km apart from each other on a straight road.  $P$  observes that the fire is at an angle of  $60^\circ$  to

the road and  $Q$  observes that it is at an angle of  $45^\circ$  to the road. Which station should send its team and how much will this team have to travel?



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**12.** A 1.2 m tall girl spots a balloon moving with wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is  $60^\circ$ . After some time, the angle of elevation

reduces to  $30^\circ$ . Find the distance travelled by the balloon during the interval.



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**13.** The angle of elevation of cloud from a point 60 m above a lake is  $30^\circ$  and the angle of depression of the reflection of cloud in the lake is  $60^\circ$ . Find the height of the cloud .



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**14.** Two pillars of equal height stand on either side of a roadway which is 120 m wide. At a point in the road between the pillars, the angles of elevation of the pillars are  $60^\circ$  and  $30^\circ$ . Find the height of each pillars to the nearest metre and position of the point from both the pillars.



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**15.** The angle of elevation of the top of a tower from a certain point is  $30^\circ$ . If the observer moves 20 m towards the tower, the angle of elevation of the top of the tower increases by  $15^\circ$ . The height of the tower is (a) 17.3 m (b) 21.9 m (c) 27.3 m (d) 30 m



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**16.** A moving boat is observed from the top of a 150 m high cliff moving away from the cliff.

The angle of depression of the boat changes from  $60^\circ$  to  $45^\circ$  in 2 minutes. Find the speed of the boat in m/h.



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**17.** From the top of a 120 m high tower a man observes two cars on the opposite sides of the tower and in straight line with the base of tower with angles of depression as  $60^\circ$  and  $45^\circ$ . Find the distance between the cars.



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**18.** From the top of a tower  $h$  m high, angles of depression of two objects, which are in line with the foot of the tower are  $\alpha$  and  $\beta$  ( $\beta > \alpha$ ). Find the distance between the two objects.



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**19.** A window of a house is  $h$  metres above the ground. From the window, the angles of elevation and depression of the top and

bottom of another house situated on the opposite side of the lane are found to be  $\alpha$  and  $\beta$  respectively. Prove that the height of the house is  $h(1 + \tan \alpha \cdot \tan \beta)$  metres.



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## Practice Test Section A

1. A pole which is 6 m high cast a shadow  $2\sqrt{3}$  on the ground. What is the sun's angle of elevation.





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2. The height of a tower is 100 m. When the angle of elevation of sun is  $30^\circ$ , then what is the shadow of tower?



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3. The angle of elevation of the sun, when the shadow of a pole  $h$  meters high is  $\sqrt{3} h$  is.

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $90^\circ$

**Answer:**



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4. An observer 1.5 metres tall is 20.5 m away from a tower 22 metres high. Determine the angle of elevation of the top of the tower from the eye of the observer.

A.  $30^\circ$

B.  $45^\circ$

C.  $60^\circ$

D.  $0^\circ$

**Answer:**



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**Practice Test Section B**

1. From a point on the ground 20 m away from the foot of a tower the angle of elevation is  $60^\circ$ . What is the height of tower?



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2. The ratio of height and shadow of a tower is  $1: \frac{1}{\sqrt{3}}$ . What is the angle of elevation of the sun?



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3. The angle of elevation of the top of a tower is  $30^\circ$ . If the height of the tower is doubled, then the angle of elevation of its top will also be doubled.



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## Practice Test Section C

1. The tops of two towers of height  $x$  and  $y$ , standing on level ground, subtend angles of

$30^\circ$  and  $60^\circ$  respectively at the centre of the line joining their feet, then find  $x : y$ .



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2. The angles of elevation of the top of a rock from the top and foot of a 100 m high tower are respectively  $30^\circ$  and  $45^\circ$ . Find the height of the rock.



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## Practice Test Section D

1. A man standing on the deck of a ship, which is 10m above water level. He observes the angle of elevation of the top of a hill as  $60^{\circ}$  and the angle of depression of the base of the hill as  $30^{\circ}$ . Calculate the distance of the hill from the ship and the height of the hill.



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